Bacillus grandii maretimi Scali & Mantovani, 1990 of the island of Marettimo (Egadi Archipelago, North-western Sicily): observations on its distribution and behaviour

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Abstract

Presence and distribution of the subspecies *Bacillus grandii maretimi* Scali & Mantovani, 1990 on the island of Marettimo (Egadi Archipelago, north-western Sicily) are analyzed. Observations are made on its ethology and actual distribution over the island, with notes on its reproduction in captivity.

Key words

Phasmida, *Bacillus*, island of Marettimo, lentisk, ocular pigmentation, disruptive coloration, mimesis, breeding.

Introduction

In October 1996 and October 1997, the author made a series of excursions over the island of Marettimo (Northwest Sicily) in an attempt to evaluate the actual distribution of the stick insect *Bacillus grandii maretimi* Scali & Mantovani, 1990, its growth season, and some of its environmentally-linked ethological peculiarities.

During the same period, observations were made on the behaviour in captivity of the first stocks collected in October 1996. *B. grandii maretimi* feeds only on lentisk (*Pistacia lentiscus* Linnaeus), called "stinco" by the islanders.

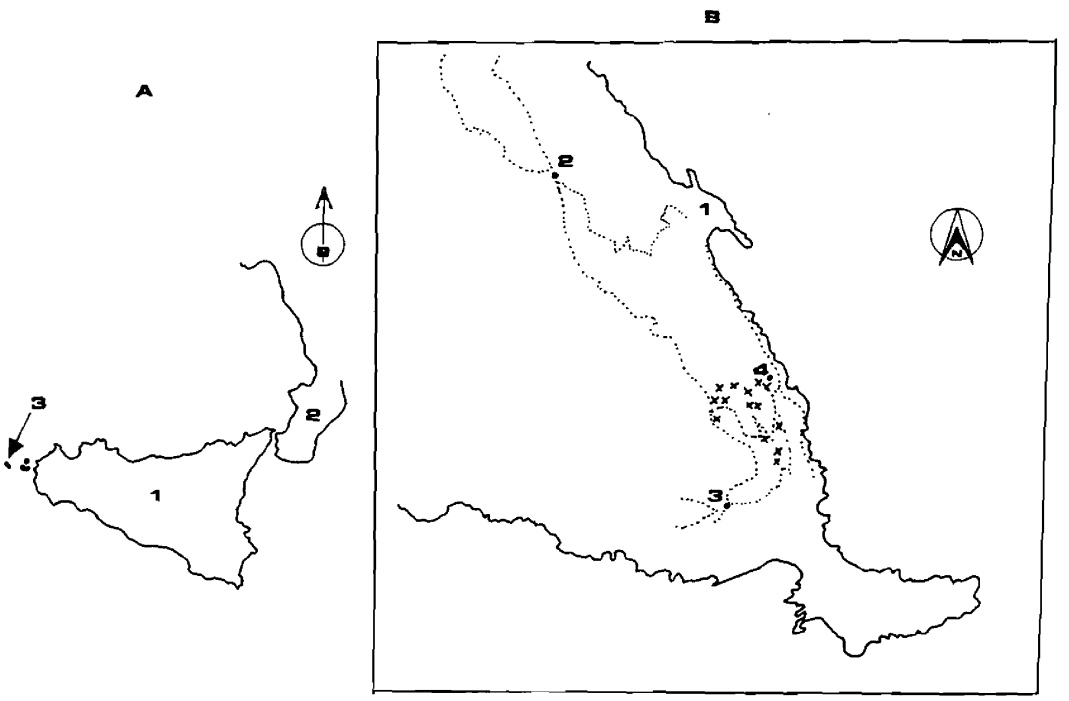

Figure 1. **a)** Location of Marettimo Island: 1 = Sicily, 2 = Calabria, 3 = Marettimo. **b)** South-eastern Marettimo. 1 = Inhabited resort, 2 = Case Romane, 3 = Carcaredda, 4 = Electricity Station, X = Findings of *Bacillus grandii maretimi*.

Bacillus grandii maretimi - a recent discovery

In 1982, researchers Giuseppe Nascetti and Luciano Bullini of the "Istituto di Genetica" at Rome University described a new species of the holomediterranean genus *Bacillus*, under the name of *B. grandii*, in honour of the notable Italian entomologist Guido Grandi (Nascetti & Bullini, 1982). This taxon was located in a very small area in the Iblean Hills (province of

Syracuse, south-eastern Sicily), near Noto, Palazzolo Acreide and Canicattini Bagni. *Bacillus grandii* is now known as the only Mediterranean species which is exclusively amphigonic (sexually reproducing). At the beginning of the 1990s, researchers Valerio Scali and Barbara Mantovani of the "Dipartimento di Biologia Evoluzionistica" at Bologna University also reported the presence of the species in western Sicily (Scali & Mantovani, 1990; Scali, 1991; Scali *et al.*, 1991; Mantovani & Scali, 1993).

Several characteristics were noted that distinguished these new populations from the original one in south-eastern Sicily. Such characteristics led up to the description of the subspecies *B. grandii benazzii* (along the Trapanese coast and on the island of Levanzo) and *B. grandii maretimi* only on the island of Marettimo (Scali & Mantovani, 1990; Mantovani *et al.*, 1992; Mantovani & Scali, 1993).

Observation of *B. grandii maretimi* revealed populations made up of a considerable number of specimens, in contrast with the other two subspecies, which are very scarce in number. The Marettimo stick insect is also genetically pure, since it is the only phasmid on the island.

The island of Marettimo

Marettimo is the last island in the Egadi Archipelago. It is located west of Favignana and Levanzo, in the direction of the coast of Tunisia (see Fig. 1a). The island is particularly mountainous, with peaks reaching over 600m above sea level: Pizzo Falcone (686m), Punta Campana (630m) and Pizzo del Capraro (627m). The mountainous spine divides the island into two distinct parts. The western slope is steep, with calcareous faces which fall sheer to the sea (the so-called "barranchi"). The eastern slope has a more gentle incline and it is there that is located the island's only inhabited resort.

Marettimo is very rich in lentisk. The plant is part of the garigue vegetation, essentially formed by the genera *Rosmarinus*, *Erica*, *Cistus*, *Pistacia* and *Euphorbia* (Massa, 1995). The genera *Rosa* and *Rubus* are not present on Marettimo.

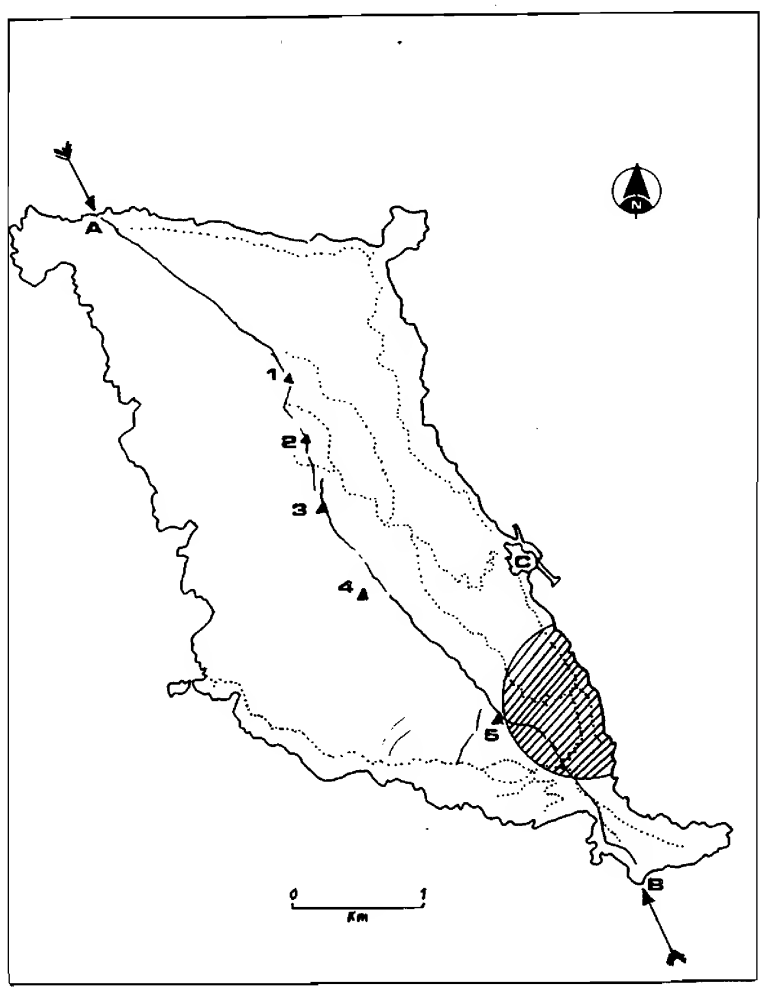

Figure 2. Marettimo.
A to B = mountainous spine of the island; C = Inhabited resort; 1 = Pizzo Falcone (686m); 2 = Pizzo del Capraro (627m); 3 = Punta Campana (630m); 4 = Punta Ansini (495m); 5 = Punta Lisandro (482m); Dotted lines indicate paths covered by the author; Shaded area indicates region where *B. g. maretimi* were found.

Distribution of the populations

The populations of *B. grandii maretimi* are found only on the eastern slope of the Island. Their lentisk is located in an Aleppo pine wood (*Pinus halepensis* Miller), along the stretch from the electrical station to the path leading to the fork for Carcaredda and Case Romane (see Fig. 1b and Fig. 2). The altitude of the area ranges from 20m to 190-200m. The lentisk is located in the undergrowth, in a shaded position, with bushes of about 1.5-2m in height (Fig. 5).

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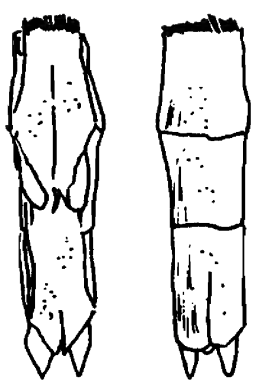

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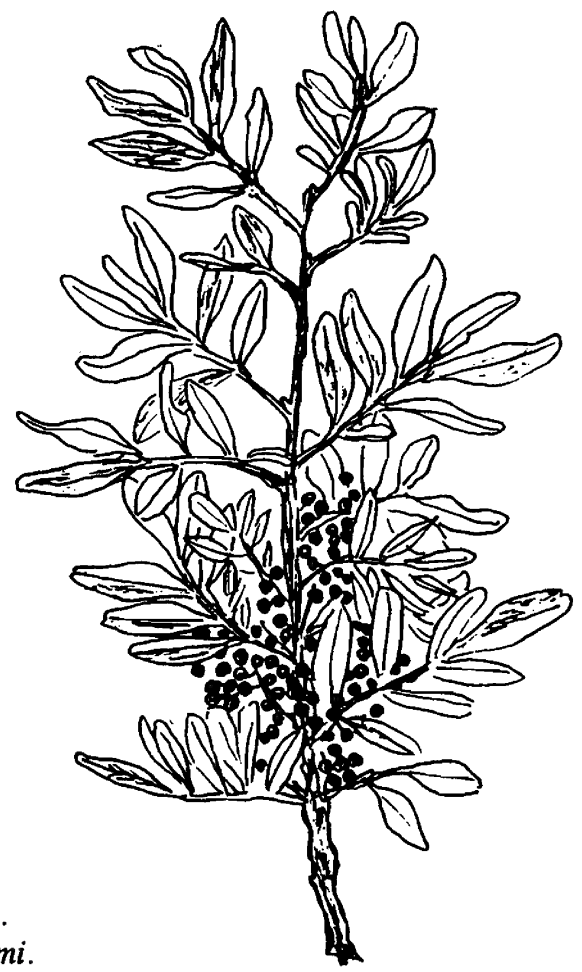

Figure 3-5.

3. Egg: Lateral, dorsal and opercular views.
4. Female, end of abdomen: ventral & dorsal.
5. Lentisk, typical foodplant for *B. g. maretimi*.

The author made reconnaissance trips almost entirely during the daytime, due to the ease of locating the insects. It was possible to work with both hands while collecting specimens in the lentisk, fortunately a non-thorny plant. Of course, such ease of operation is not possible in the *Rosa* and *Rubus* spp. (rose and bramble) of the Iblean area.

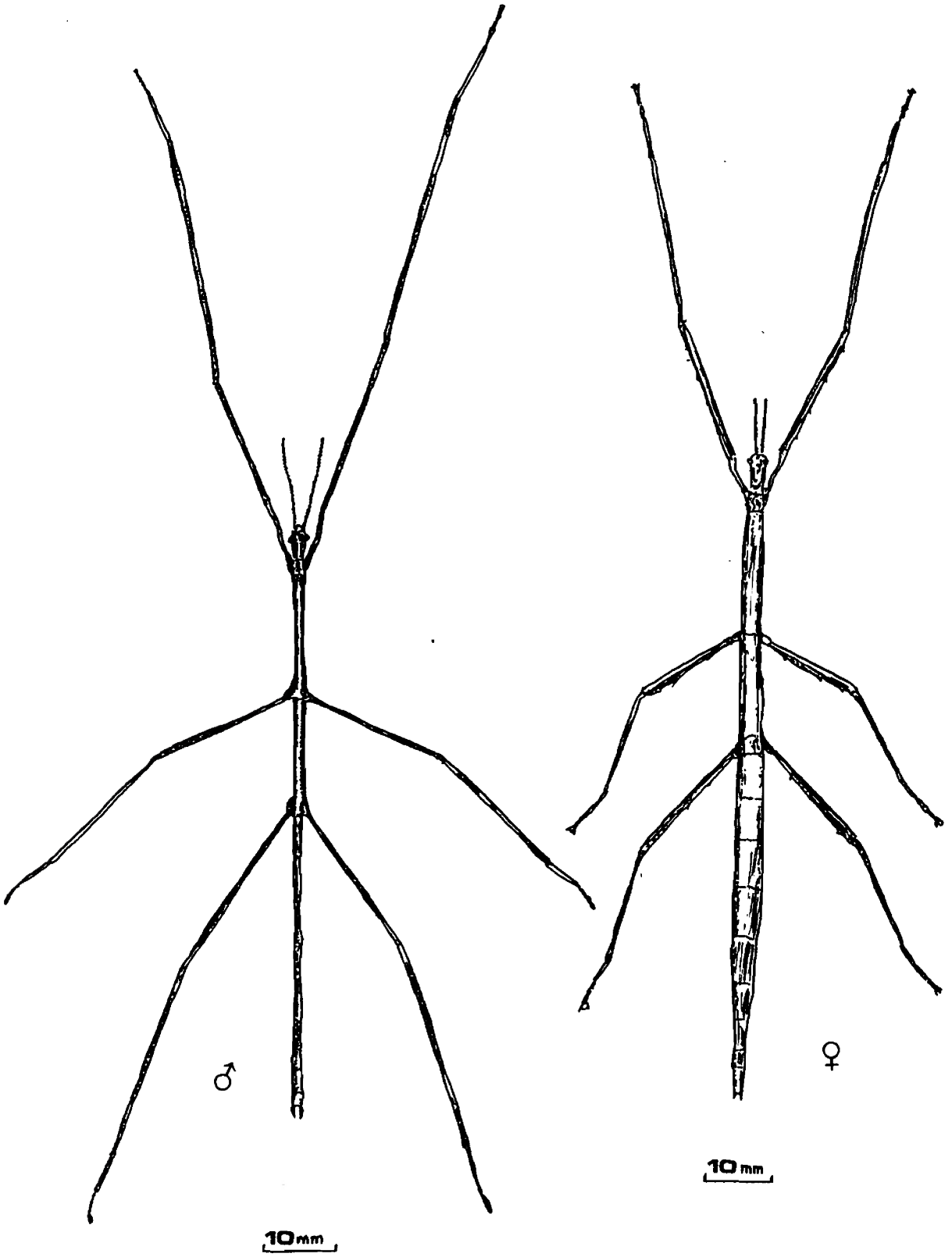

Figure 6. Adult male and female *Bacillus grandii maretimi*.

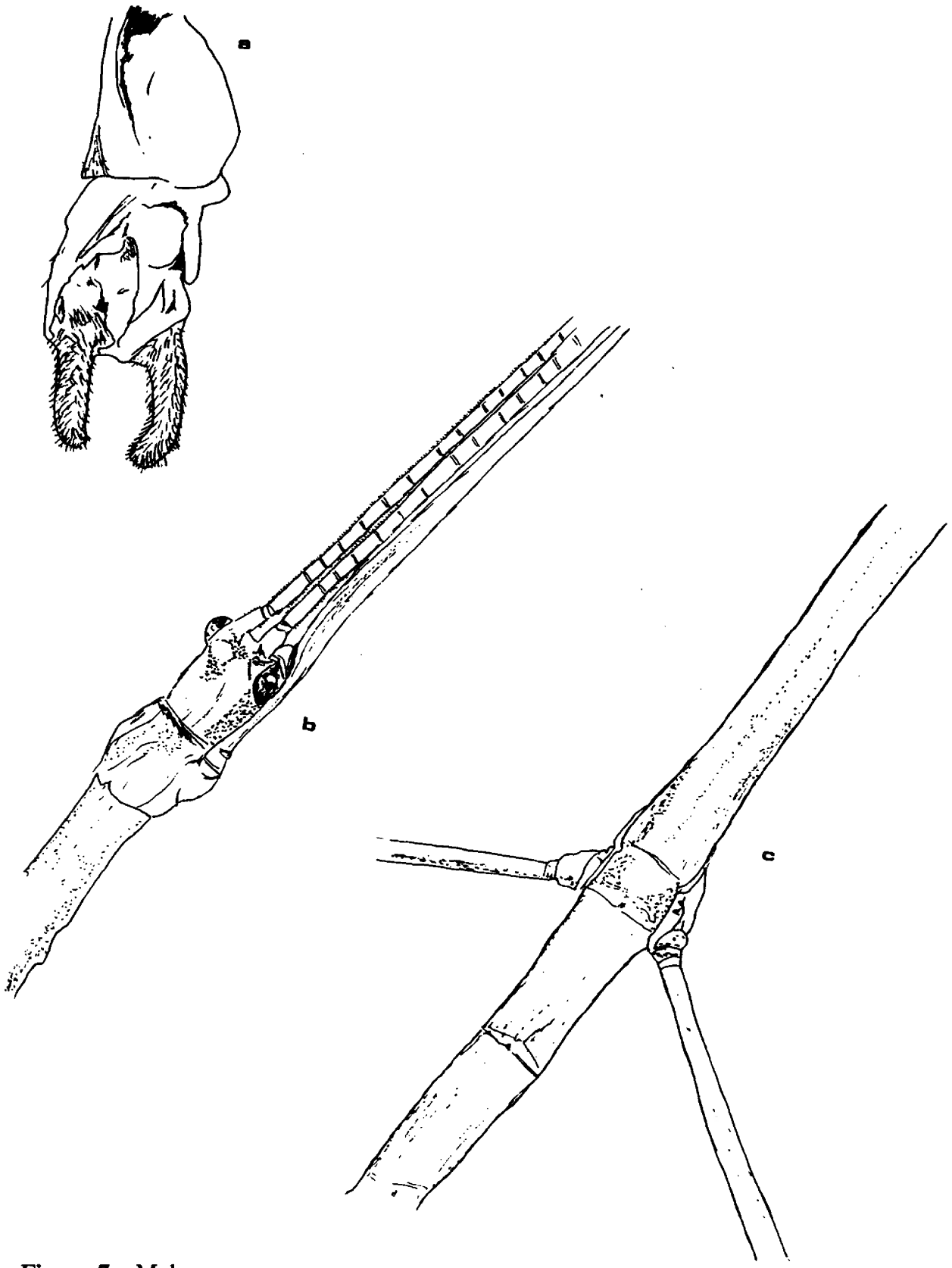

Figure 7. Male.
a) Ventral view of abdomen; **b)** Head; **c)** Mid legs.

Findings were made at the beginning of October 1996 and 1997, but only young nymphs of *B. grandii maretimi* were found. All these nymphs were from the first and the third instar, except for one of them (probably at the fourth instar). This fact leads us to believe that the annual period of egg hatching occurs in August and September. In fact, although the island enjoys a mild climate, only a negligible proportion of these insects seems to be able to overwinter at the nymphal stage. The sex ratio appears to be equal.

Areas of Marettimo in which the author found specimens are marked on the map (Figs. 1b & 2). As noted above, the only area in which the presence of *B. grandii maretimi* was observed was a small pine wood, which maintains uniform shade over the lentisk of the area. *B. grandii maretimi*, in fact, seems to shun any area parched by the sun. This observation applies equally to the two other subspecies of the taxon. However, it must be borne in mind that *Pinus halepensis* was brought to the island as part of the reforestation process of 1962-63. Prior to that date, there was only a small autochthonous station of this tree, located near spring Pegna next to the fork for Punta Troia (Vaccaro, 1998, personal correspondence). The same marked area for the Marettimo's phasmid also plays host to two interesting endemic molluscs of the genera *Sicilaria* and *Oxychilus* (Gastropoda: Pulmonata: Stylommatophora), also observed by the author.

Ethological observations

Males of *B. grandii maretimi* differ from their counterparts in the Iblean Hills (*B. grandii grandii*) by their ocular pigmentation, having a wide pigmented bar which horizontally crosses each compound eye. In addition, males do not have - to any clear degree - the black and white areas of chromatic desegregation (disruptive coloration) at the beginning of each tibia, which is a typical morphological characteristic of the Iblean sub-species.

During the daytime, nymphs of *B. grandii maretimi* remain motionless, hanging onto leaves of lentisk, both upwards and downwards.

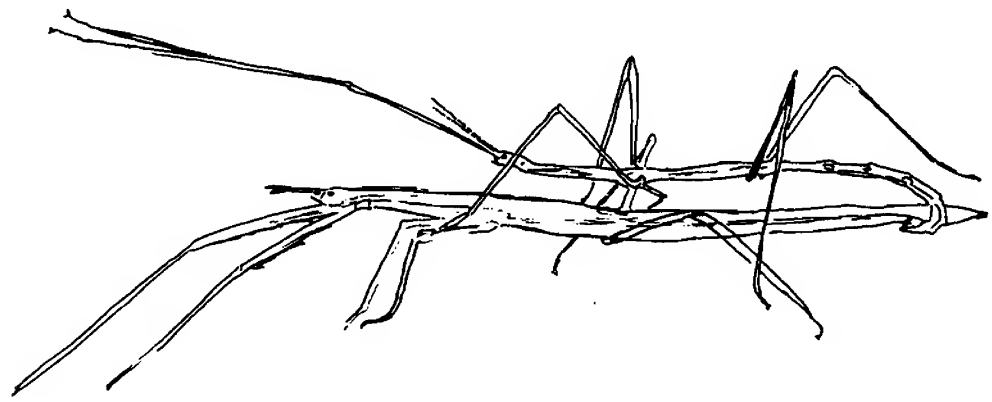

Figure 8. Mating pair of *Bacillus grandii maretimi*.

The author has observed some females whose thorax and abdomen showed clear yellow streaking; these specimens were perfectly camouflaged when on decaying and yellowing twigs of lentisk. However, as a rule, mimesis in this stick insect manifests itself by reproducing green shades, since lentisk leaves are dark green (to greater and lesser degrees depending on whether they are in the shade or under direct sunlight). The male is brown in colour but is able to generate a reddish tint in the meta- and meso- thoracic segments so as to mingle with the twigs of lentisk.

In the wild, the age limit of *B. grandii maretimi* seems to be about five or six months,

or until winter, though not all the individuals die at that point. Populations kept in captivity may easily double their lifespan, if housed at suitable temperatures.

In the wild, the females (see Figs. 4 & 6) survive on average about one month longer than do the males. The males (see Figs. 6 & 7) are quite fragile and vulnerable to drops in temperature. The author has bred females that have lived for one year; similarly kept males have not surpassed ten months. Once they have reached sexual maturity, the insects go about mating (Fig. 8). Each copula may persist some hours. As it is typical of most stick insects, the activity of *B. grandii maretimi* is prevalently nocturnal. The male is clearly more active because its instinct is to move about in search of females.

Acknowledgements

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